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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/821,172	04/09/2004	Jin-ho Kim	1572.1340	8402
21171	7590	05/17/2007		
STAAS & HALSEY LLP SUITE 700 1201 NEW YORK AVENUE, N.W. WASHINGTON, DC 20005			EXAMINER KOCA, HUSEYIN	
			ART UNIT 3744	PAPER NUMBER
			MAIL DATE 05/17/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/821,172

Applicant(s)

KIM ET AL.

Examiner

Huseyin Koca

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 March 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04/09/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some * c) ☐ None of:
 - 1. ☐ Certified copies of the priority documents have been received.
 - 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-14 and 18-21 have been considered but are not persuasive in view of the new ground(s) of rejection.

The indicated allowability of claims 15-17 is withdrawn in view of newly discovered reference(s) to Henderson (2,667,041) and Brun et al. (6,668,566).

Rejections based on the newly cited reference(s) follow.

As such this office action is being made non-final to afford the applicant the opportunity to respond to the new grounds of rejection.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Harbers (2,728,204).

In regard to claim 1, Harbers teaches an evaporator forming frost having a coolant tube (13) which is bendable (Fig. 1); heat exchange fin (12) with a coolant tube accommodating part contacting the coolant tube (see Fig. 1 below); a defrosting unit to remove the frost formed on the evaporator (defrosting unit is inherent because during the defrosting period, there has to be a defrosting unit C-1, L-37-39); the heat exchange fin is inclined by an inclination angle formed between a vertical direction and longitudinal

direction being an acute angle relative to the vertical direction (see Fig. 1 below); the heat exchange fin has rounded corner parts on opposite sides (see Fig. 1 below); and a bottom end below the corner parts where the inclination angle causes the water drops flow downward (see Fig. 1 below).

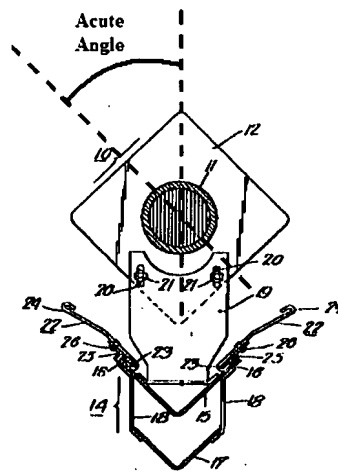


Fig. 1 – Fig. 2 of Harbers (2,728,204)

In regard to claim 14, Harbers teach that the heat exchange fin has polygonal shape (see Fig. 2).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
6. Claims 2 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harbers (2,728,204).

In regard to claims 2, Harbers's heat exchange fin includes rounded corner parts but he does not explicitly teach the dimensional value of the radius. The one of ordinary skill in the art would have recognized that a heat exchange fin size can be different depending on the application. For example, bigger refrigerators that use bigger cooling tubes have larger fins. The size of the fin can be an affecting factor for the dimension of the radius on the rounded corners. Further, one of ordinary skill in the art would have known that rounded corners will result less stress on the fin surface. Thus, dimension of the radius on the corner will also affect the stress distribution on the fin surface. It would have been obvious to one having ordinary skill in the art at the time the invention was made to round the corners of the fin between 5 and 20 mm to avoid sharp edges and to be able to minimize the stress on the fin surface. Fins with rounded edges will make the installation process safer and it will help to avoid possible injuries. One of ordinary skill in the art would have arrived at these dimensions without undue experimentations.

In regard to claim 12, when the fin is inclined, it changes its position from rectangle (square) shape to diamond shape which changes the overall height of the fin. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to know that the inclination angle of the heat exchange fin is

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based on the length of the heat exchange fin and the distance between the coolant tubes along vertical direction in order to avoid the heat exchange fin hitting the below tube and the below heat exchange fin after it is being inclined.

7. Claims 3, 5, 7, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harbers (2,728,204), and further in view of Lakdawala et al. (6,435,265).

In regard to claims 3 and 11, Harbers teach most of the limitations of the claim but do not explicitly teach that the inclination angle of the heat exchange fin is between approximately 50 degrees and 75 degrees or 40 degrees and 50 degrees. Lakdawala et al. teach that the fins at acute angle to the vertical (C-3, L-64-67). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to set the angle between approximately 50 degrees and 75 degrees or 40 degrees and 50 degrees as taught by Lakdawala et al. in Harbers refrigeration apparatus to adjust the amount of airflow between the fins, and also to avoid contacting the (other) pipes when the condensate drops down the fin in order to advantageously increase the efficiency of the system.

In regard to claim 5, Lakdawala et al. teach that the evaporator is installed on a wall (13) (see Fig. 1); and the heat exchange fin is inclined toward one side relative to the vertical direction, and the bottom end of at least one heat exchange fin is adjacent to the wall on which the evaporator is installed (see Fig. 2).

In regard to claim 7, Lakdawala et al. teach that the heat exchange fin (5) has a substantially rectangular shape, and at least one coolant tube accommodating part (7A) is positioned on a surface of the heat exchange fin in a pair (see Fig. 2).

8. Claims 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harbers (2,728,204) and Lakdawala et al. (6,435,265), and further in view of Tanaka et al. (4,715,437).

In regard to claim 4, Harbers and Lakdawala et al. teach most of the limitations of the claim but do not explicitly teach at least one protrusion from a surface of the heat exchange fin. Tanaka et al. teach that the heat exchange fin includes at least one protrusion (24) protruding orthogonally from a surface of the heat exchange fin (C-5; L-1). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have protrusion from a surface of the heat exchange fin as taught by Tanaka et al., in Harbers and Lakdawala et al. refrigeration apparatus to realize the evaporator fin having a low pressure loss and a high heat transfer rate in order to advantageously increase the efficiency of the evaporator.

9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harbers (2,728,204), and further in view of Jasper, II et al. (5,552,581).

In regard to claim 6, Harbers teaches most of the limitations of the claim but does not explicitly teach coolant tube supporters on opposite sides of the evaporator. Jasper, II et al. teach two coolant tube supporters (40, 42) on opposite sides of the evaporator supporting the coolant tube (C-2; L-32-34). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use coolant tube support

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as taught by Jasper, II et al. in Harbers refrigeration apparatus in order to support the coolant tubes of the evaporator in order to advantageously keep the fins, the cooling tube and the evaporator sturdy and prevent them getting damaged during operation.

10. Claims 8, 10, 13, 18, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho (5,499,514), and further in view of Harbers (2,728,204).

In regard to claims 8 and 10, Ho teaches a refrigeration apparatus generating cooling air where an evaporator (24) comprising a coolant tube (40) having at least one bending part, and at least one heat exchange fin (42) with at least one coolant tube (40) accommodating part contacting the coolant tube (C-3; L-47-51); a defrosting unit (44) adjacent to the evaporator is used for removing frost formed on the evaporator (C-3; L-52-53); a main body including a storage compartment (14) supplied with cooling air generated by the refrigeration apparatus (C-3; L-29-30); and a door covering the opening of the storage compartment (C-3; L-14-15). Ho does not explicitly teach the details of the heat exchange fin. Harbers teaches a heat exchange fin which is inclined by an inclination angle formed between a vertical direction and longitudinal direction being an acute angle relative to the vertical direction (see Fig. 2); heat exchange fin has rounded corner parts on opposite sides (see Fig. 2); bottom end below the corner parts where the inclination angle causes the water drops flow downward (see Fig. 2); and the bottom end of the heat exchange fin is adjacent to the wall (22) (see Fig. 1). It would have been obvious to one having ordinary skill in the art at the time the invention was made to incline the heat exchange fin and round the opposite corners as taught by Harbers in Ho refrigeration apparatus in order to advantageously improve the efficiency

of the evaporator by avoid contacting the (other) pipes when the condensate drops down the fin.

In regard to claim 13, Ho teaches that the water is disposed in an evaporator accommodating part containing the evaporator (C-3; L-54-61).

In regard to claim 18, see claim 8 above.

In regard to claims 19 and 20, see claim 2 above.

11. Claim 9, is rejected under 35 U.S.C. 103(a) as being unpatentable over Ho (5,499,514) and Harbers (2,728,204), and further in view of Tanaka et al. (4,715,437).

In regard to claim 9, Ho and Harbers teach most of the limitations of the claim (see claim 8), but do not explicitly teach at least one protrusion from a surface of the heat exchange fin. Tanaka et al. teach that the heat exchange fin includes at least one protrusion (24) protruding orthogonally from a surface of the heat exchange fin (C-5; L-1). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have protrusion from a surface of the heat exchange fin as taught by Tanaka et al., in Ho and Harbers refrigeration apparatus to realize the evaporator fin having a low pressure loss and a high heat transfer rate in order to advantageously increase the efficiency of the evaporator.

12. Claims 15, 16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henderson (2,667,041), and further in view of Brun et al. (6,668,566).

In regard to claim 15, Henderson teaches a method of defrosting an evaporator having at least one heat exchange fin (11) which includes at least a rounded edge and a sharply edged bottom (see Fig. 2 below); forming frost in the evaporator during

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refrigeration cycle (C-1, L-15-20); collecting water formed in the defrosting on the sharply edged bottom of the heat exchange fin (see Fig. 2 below); the water flows along the rounded edge and downwardly sloped length of the heat exchange fin (see Fig. 2 below); and water collected on the sharply edged bottom of the heat exchange fin flows down the evaporator accommodating part (20) (C-3, L-48-52). Henderson does not explicitly teach defrosting the evaporator after each refrigeration cycle. Brun et al. teach defrosting the evaporator after each refrigeration cycle (C-1, L-42-45). It would have been obvious to one having ordinary skill in the art at the time the invention was made to defrost the evaporator after each refrigeration cycle as taught by Brun et al., in Henderson refrigeration system in order to advantageously increase the efficiency of the evaporator which will therefore will increase the overall efficiency of the refrigeration system.

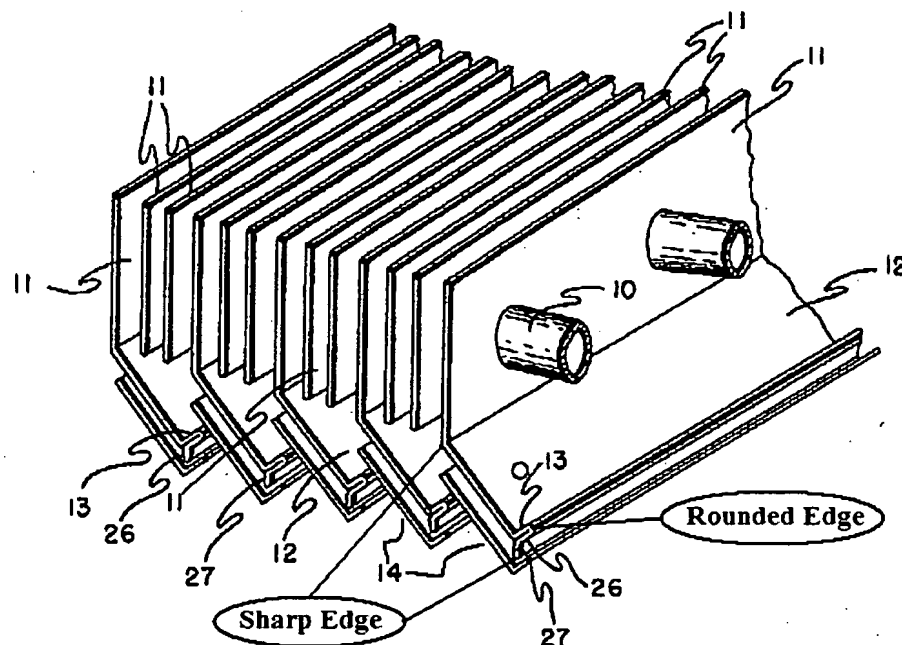


Fig. 2 – Fig. 4 from Henderson (2,667,041)

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In regard to claim 16, Henderson teaches disposing the collected water through a discharge hole (25) (Fig. 3).

In regard to claim 17, Henderson teaches disposing the collected water with a water accommodating part (25) at a bottom of the evaporator accommodating part (20) (C-3, L-62-64; see Fig. 3).

13. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harbers (2,728,204) and Ho (5,499,514), and further in view of Maudlin (3,750,418).

In regard to claim 21, Harbers and Ho teach most of the limitations of the claim but do not explicitly teach that the heat exchange fin includes one sharply-edged corner. Maudlin teaches a heat exchange fin which contains a sharply-edged corner (22) (C-2, L-40-43; also see Fig. 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have at least one sharply-edged corner as taught by Maudlin, in Ho and Harbers refrigeration apparatus to accurately bring the moisture to condensate collector which will advantageously improve the efficiency of draining the condensate moisture and as a result improve the efficiency of the fins.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Huseyin Koca whose telephone number is (571) 272-3048. The examiner can normally be reached on Monday - Friday 9:00AM to 4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on (571) 272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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